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[Aller au sommaire du numéro](#)

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SCIENCE AND SCIENTISTS IN GOVERNMENT,

1878-1896 -- PART II*

Vittorio G.M. DeVecchi

The weight of politics in determining the structure and activities of the scientific departments of government was also reflected in the details of personal careers. As noted in the previous article, the choice of Fletcher as Dominion Entomologist proceeded from a complex set of factors encompassing the farmers' view of useful science, the Conservatives' understanding of the place science had in government, as well as the ever-present element of patronage. Expertise in the relevant scientific fields was also, naturally enough, a pre-condition of employment; but other biographical traits such as original occupation, political allegiance and family connections were equally important. Competence became the main official criterion for government employment only after the Civil Service Act of 1908, which set up a system of truly competitive examinations. Technical and scientific services were traditionally less open to patronage than other departments, but it was a matter of degree. It may be fair to say that, by and large, the more advanced the professionalisation of a scientific field, the less political influence it would have. It is easy to see how this state of affairs would account for the relative preponderance of scientific practitioners -- the product of incomplete professionalisation -- in the government's scientific services. And, after having made an interest into a paid occupation, the practitioners strove to transform the latter into a career.

During the years here considered, the federal government began to provide, in a restricted number of disciplines, an alternative for men of science: the other main way to earn a living as a scientist was college teaching. But the government's role in fostering the professionalisation of Canadian science had implications that were quite different from those of an academic career. First of all, to work in the Geological Survey, the experimental stations or the Meteorological Service meant to do research. Despite notable exceptions, such as the establishment of the first Canadian physics laboratory by James Loudon in Toronto in 1878, the German research ideal did not make visible inroads into Canadian university practice until relatively late; before the late eighteen-nineties colleges and universities were essentially teaching centres. The federal government, therefore, provided a unique opportunity and one, in fact, taken up on a part-time basis during the summer also by college professors, among them the

* This is the third and final article drawn from the late Vittorio DeVecchi's Toronto dissertation, 'Science and Government in Nineteenth-Century Canada.'

geologists Loring W. Bailey of the University of New Brunswick, J-C-K Laflamme of the Universit  Laval and J.W. Dawson of McGill University. The separation of the two activities of teaching and research was still quite sharp in 1884 in the mind of David P. Penhallow, botany professor at McGill and former director of the Houghton Farm Experiment Station in the state of New York.¹

The second different implication was the need of adapting to or, even better, being naturally compatible with the received ideas and consequent expectations of political men. Such a requirement was particularly evident in the case of the directors of federal scientific departments and amounted to a number of requisites concerning those scientists' training, character and ideas about the nature and usefulness of science.

The qualifications of a director, of a person that is caught at the junction of two different sub-cultures needed to be acceptable in both camps. Scientific achievement determined the reception of his leadership among men of science while the ability to see beyond science the broader political and economic context determined his success in government. In the particular political atmosphere described in the preceding article, the two requirements often could run counter to one another. For scientific achievement was increasingly accompanied by specialisation, but the same logic that traditionally cast the chemist of the Geological Survey in an ancillary role as the holder of an established and specialised skill also required a director to be a generalist. An ideal hierarchy could be reconstructed: the specialised scientists would ascertain and collect 'scientific facts,' the director would mediate between practical requirements and research. Selwyn admitted as much when asked whether the director of the Canadian Geological Survey should have sufficient specialised knowledge to direct his specialists:

Yes, but not to interfere with their work any more than they with his. It has been found, however, that the Director of a geological survey should be a field geologist. Sir William Logan was neither a chemist, palaeontologist, or naturalist, but he sought to get men on the survey, who had made these branches their special study and he had to direct them all. The best managers of mines know nothing about mining, but they are business men, and they get specialists to conduct the several branches.²

The strong temptation was to proceed one step further and conclude that the direction of research should be in the hands of a politician or, what then amounted to the same, of a high civil servant. The matter was discussed in unusually clear terms between Professor Penhallow and two MPs, the Conservative George T. Orton and the Liberal Sydney Fisher, later Minister of Agriculture in Laurier's cabinet:

[Orton] In fact, the business of the Bureau
[of Agriculture] would be to provide scientific

knowledge for the agricultural people at large? -- [D.P. Penhallow] Yes. [Orton] And to give the people the benefit of science, in the way of testing seeds and other matters that are purely scientific? -- [Penhallow] Yes. It must be remembered that all the practical part of agriculture is based upon scientific facts -- scientific knowledge. The first requisite is to obtain exact facts, and then these may be elaborated and adapted to the wants of the practical farmer. But you cannot, in an institution of this kind, carry on practical experimentation which is not based upon scientific accuracy, because the results will be of no permanent value; whereas, if it is done upon a basis of scientific accuracy it will be of permanent value, as well as of immediate value. The reason why the German institutions are so successful is because they have been in charge of men of the highest scientific attainments and their work has been strictly scientific in its character. It has been adapted to the work of practical farming, and the farmers appreciate it.

[Sydney A. Fisher] I think the reasoning would apply more to the gentleman who is in charge of a station, the professor or scientific man, than to the head of a Bureau. The head of the Bureau would have to be a man who would more especially understand the needs of the agricultural community, and who could view them from the broad standpoint of a statesman; whereas, the specialist who may be in charge of certain work of the Bureau, would be certainly required to be a man of scientific attainments? -- [Penhallow] If you will excuse me for saying so, I think that there is where one mistake is made. Of course I recognised that a man who is in charge of the Bureau must be a man able to understand the wants of the farming community at large. But at the same time, he must be a man of high scientific attainments: first, because if he is, he can the more readily grasp the wants of the farmers and appreciate them, and in the second place, because if he is a man of scientific attainments those specialists under him will have respect for what he proposes. If you place in charge of a Bureau of Agriculture, as director of the scientific working of that system, a man who has no scientific qualification, and then if you place under him, in charge of one of the departments of that Bureau, a man who is far superior to him as a scientific man, it is like placing the cart before the horse.³

The man who was best suited to his directorial position was William Saunders, of the Experimental Farms system. His scientific status was indisputable: a chemist by trade and

an entomologist by choice, Saunders' eminence was sanctioned by a fellowship of the AAAS in 1874, and of the Royal Society of Canada in 1882. In contrast with such formal recognitions, his training was completely non academic. After having come to Canada from Britain at the age of twelve, he was promptly apprenticed to Dr John Salter, the surgeon, Conservative editor of the *Times* and 'patriarch of druggists' in London, Ontario. The interest in entomology grew as an extension of the functions of a successful pharmacist and commercial chemist, as Saunders became, in a farming region. The work in experimental fruit growing and selecting Saunders engaged in privately since 1868 was at the same time the practical aspect of a scientific interest, and the intelligent hobby of a prosperous businessman. In this sense, he conformed with the old-fashioned figure of the amateur scientists, the type of scientific cultivator which formed the bulk of the membership of local scientific societies.⁴ In another sense, however, Saunders differed from the usual pattern. The Entomological Society of Ontario he founded in 1863, together with the Rev Charles J.S. Bethune of Port Hope, was a specialised society which quickly acquired chapters in London, Toronto, Kingston, Montreal and Quebec, thereby achieving a measure of national importance, quite a new departure from the common model of local societies, covering a wide range of subjects but a very limited geographical area. A special interest in sectional or professional organisations was also evident in the role played by Saunders in the formation and subsequent history of the Fruit Growers' Association of Ontario (1868) and of the Ontario College of Pharmacy (1871).

The same spirit led him to help form the Entomological Club of the American Association for the Advancement of Science, of which he was a member since 1868, at the Hartford meeting of 1874 where he was made fellow of the association. The club met for the first time the following year at Detroit, and Saunders was appointed to a committee 'to prepare and present to the Club at its next annual meeting a compendium of the view of leading Entomologists of the country upon points which, in their judgment, require elucidation.'⁵ Other members of the committee were S.H. Scudder of Cambridge, Mass. and J.L. Leconte of Philadelphia, the two leading American entomologists and former associates of Louis Agassiz. Two English-born scientists were also members of the Club: Charles V. Riley, whose career had many points of contact with that of Saunders, started in life without formal education, was in those years State Entomologist of Missouri and was to become US Entomologist; and A.R. Grote, the curator of the Buffalo Society of Natural Science and a frequent contributor to Saunders' and Bethune's *Canadian Entomologist*, who had in common with his fellow committee member from Canada a passion for music.⁶ In short, Saunders' scientific frame of reference, both intellectual and organisational, was firmly North American rather than imperial.

But it was Saunders' credentials as a promoter and a man of business that ultimately vouched for his scientific work. 'In labor there is profit' was the revealing motto he prefaced to his 1870 prize essay for the Fruit Growers' Association.

As one of the London and Middlesex County notables who took part in many local initiatives, Saunders came into contact with supporters of both main parties. In a city then staunchly Conservative, it is natural that he would associate himself with such people as Richard Tooley, the Tory MPP for Middlesex East, Thomas Routledge, Warden of Middlesex and later unsuccessful Conservative candidate to the provincial Legislature and the oil merchant and insurance executive James Johnson, as well as the Reformer Henry Anderson. Saunders was a member, with them and others, of the local committee of the 1869 Provincial Exhibition, held in London in that year; they were all also among the officers of the London Horticultural Society and of the East Middlesex Agricultural Society, the two bodies that yearly united since 1867 to produce the Western Fair Association.⁷ Saunders followed James Johnson and Richard Tooley to the presidency of the Western Fair in 1872; in 1876 he also became a director, and in 1879 the president of the Huron and Erie Loan and Savings Company, an investment company in which the Liberal senator Elijah Leonard, one of the original promoters, retained a sizeable interest. It was the testimony of these practical achievements that in 1886 forced William Weld, the fierce opponent of government intervention in agriculture, grudgingly to concede that Saunders could make a success of the federal experimental farms system, and to recognise:

He is not an office seeker. He is an eminent chemist who can make an honest living, and has devoted his spare moments to various sciences out of pure love for them. He is not a practical agriculturist, and although the science of agriculture is not his forte, yet he is an eminent horticulturist and entomologist, and we believe that he could easily adapt himself to the new situation, should he be appointed director of the experiment stations -- and there is no doubt but he will.⁸

John Carling's political acumen served him well; the man he knew in London at least since the 'sixties and whose entomological work he fostered in his capacity as Ontario Commissioner of Agriculture for the first time in 1870 by 1885 could muster impressive scientific certification (FRSC, Professor of Materia Medica at the Medical College of the first, ill-fated Western University) and the approval of the foremost organ of the farming industry. Furthermore, Saunders' American contacts made him all the more suitable to carry out the American-inspired recommendations of the Gigault committee.

Selwyn never really fitted in so successfully. It was not just that his temperament was resented by some of his staff, as the 1884 open clash evinced; there was a number of more substantial reasons. In a period, and in a country in which few men were conversant with science and even fewer among economic operators, the work of the scientific departments of government involved much that could be called popularisation. The emphasis placed on information and service required it. But communication between scientists and laymen could only be

successful insofar as both groups shared some assumptions and interests. The popular appeal of the natural sciences was associated with the idea that 'everybody can be a scientist at least in comprehension.'⁹ Therefore the accusations of 'scientificity' and 'love of theory,' mentioned in the previous article, that were levelled against Selwyn and his department amounted to the charge of betraying the potential of science. They were also the symptom of an increased degree of professionalisation, for the identity of a profession is based on a claim to exclusive competence -- a notion incompatible with the frame of mind needed for effective popularisation. The style of behaviour established in the Geological Survey by Selwyn and preserved by his successor George M. Dawson after 1894 included as a positive value the fact that 'the public cannot properly understand the work.'¹⁰ That very value was attacked by Simon J. Dawson, the Conservative MP for Algoma, when he censored the report -- which, like all reports, was revised by Selwyn -- of the recently-appointed 'practical' man Eugène Coste, asserting that 'the frightful rush of scientific terms in which he has indulged is nothing more than a specimen of the dust usually raised by the charlatan in a vain endeavour to conceal his own incompetency and lack of knowledge.'¹¹

The remoteness of Selwyn's experience and tastes from the Canadian political practice of the time is nowhere more evident than in his opposition to any employee of the Survey having a financial interest in mining operations: Henry Vennor was dismissed for it, Eugène Coste spontaneously resigned and in 1890 Selwyn managed to have the rule actually approved by Parliament. What is more, a clause forbade even to 'make investigations or reports relating to the value of the property of individuals,' thereby dashing all hopes that the Survey might be useful as a free consulting agency.¹² Selwyn's old-fashioned, stern sense of propriety and correctness, possibly rooted in his social origins as well as in his age (he was born in 1824), in practice fostered the value of disinterestedness, a basic component of the modern scientific ethos with the Geological Survey.

Personal history was also important. The contrast of Selwyn and Saunders is illuminating: the former, an upper-middle class gentleman, son of a clergyman, member of the Church and England and an Englishman; the latter, a socially mobile businessman, son of an immigrant shoemaker, a Methodist and practically a Canadian. The last characteristic carried weight: Canadian nationalism was not a very important issue in scientific matters but was an issue nevertheless. Robert Bell did not hesitate to use it in his attempt to displace Selwyn at the head of the Survey: 'I do not care to be considered a slave, although only a Canadian,' Bell sarcastically noted in a *cahier de doléances* to the Minister of the Interior.¹³ In the same vein, Bell's assertion that Canadians would make better geographers than anyone else because of their familiarity with the terrain and because 'maps are very common in this country' was stretched with the obliging help of E.C. Barker, Conservative member for Victoria, BC, to become the proof of the better suitability of Canadians for work with

the Geological Survey -- 'Canada for the Canadians,' Bell and Baker concurred.¹⁴ Such nonsensical arguments had the virtue of simplicity. Edward Holton, Liberal MP and Richard W. Heneker, Galt's successor as Commissioner of the British American Land Company, agreed that 'the best men are Canadians' upon consideration of the problem of foreign geologists 'learning the ways of the country.'¹⁵

Even discounting personal ambitions and political antagonisms, those statements reflected a not uncommon sentiment. As Goldwin Smith noted in 1889,

Canadians, while they profess and no doubt feel great love for England, are disposed in an increasing degree to look upon the English immigrant as an interloper. The appointment of an Englishman to any office or place, even in a bank, excites jealousy, and it appears to be easier for Americans than for Englishmen to make their way here in public life.¹⁶

To be a Canadian in the 'eighties could well appear to some to be a qualification that should help secure one of the new permanent positions in the civil service. For the transfer of the Geological Survey's salaries to the civil list in 1883, preceded and followed as it was by a series of measures aimed at modernising the civil service, seemed to mark the beginning of an era when it would be possible to have a formal and proper career in the scientific branches of government. The first bill, introduced in 1882 and amended in the ensuing years, took its cue from the relatively recent British system and created a Board of Examiners which was in charge of periodically setting a test that prospective civil servants were required to pass. Both the notion of selection by examination and the discontinuity in the salary scale demarcating the higher, more qualified classes from the lower ones seemed to prize intellectual gifts and expertise.¹⁷ Carpmael's campaign to obtain permanent appointments for the personnel of the Meteorological Service acquired a new urgency. He had been repeating the request since his appointment as director in 1880,¹⁸ and in 1883 he further pointed out that the observers' work was 'of a nature which requires special abilities for its successful accomplishment.'¹⁹ In the successive revisions of the Civil Service Act, however, the exemption from the qualifying examination at first granted to professional and technical personnel when employed in their area of expertise was extended to all manner of cases.²⁰ Such an extreme dilution of standards made nonsense of the initial emphasis on qualification and made explicit the discrepancy between the values of politicians and of men of science.

Far from securing the incorporation of the Meteorological Service into the civil service, something the Geological Survey obtained in 1877, Carpmael actually had difficulties in keeping the observers he already had. As long as the two charges of director of the Magnetic Observatory and of superintendent of the Meteorological Service were combined in the same person, the Service was immovable from Toronto. Furthermore, since the magnetic observers were on the civil list

since Confederation and since they often doubled as meteorologists, in a sense some of the central personnel of the Service did have permanent posts although not as employees of the Service. All of this was very irregular for a department not directly under the eyes of the government in Ottawa. The only solution the Department of Marine seemed to be able to envisage was the removal of the magnetic work to Ottawa, possibly assuming that the Meteorological Service would go along at no extra cost. The scheme, first put forward in 1874, was resisted on scientific grounds: a move of six degrees of longitude, it was argued, would have upset the whole international system of observations. A subsequent protracted contention over property between the University of Toronto and the federal government contributed to paralyze all changes until the beginning of 1885.²¹ Finally, a new attempt in 1892 met with the total disinterest of the Surveyor-General to whose department the Toronto establishment would have been transferred.²²

In the meantime, as Carpmael remarked, the officers of the Service were 'watching for a chance of some appointment elsewhere, where their services would be more adequately remunerated.'²³ The chance of a secure position was indeed slim. Besides Carpmael's part appointment -- the rest of his salary was paid by the University -- the only other salaries paid from the budget of the Toronto Observatory were those of three observers, two of whom appointed since 1853 during Cherriman's tenure as director. The aging incumbents could not be expected to change jobs, and they clearly were not going to retire. The distinguished but insecure career of Lieut Andrew R. Gordon, RN, was a consequence of this state of affairs. After having retired from the Royal Navy and moved to Canada, Gordon was chosen by Carpmael as deputy-superintendent -- which normally meant also heir-presumptive -- of the Meteorological Service in 1880. He became Carpmael's second-in-command not only in the Service but in astronomical matters as well. He went to England in 1882 to establish contact with Edward J. Stone, the Radcliffe Observer at Oxford, in order to coordinate the Canadian observations of the transit of Venus of 6 December 1882 with the rest of the British system directed by Stone. On that occasion, Gordon also purchased the first telescope ever possessed by the Toronto Observatory.²⁴ He then went on to command, temporarily seconded from the Meteorological Service, the Hudson Bay expeditions of 1884, 1885 and 1886. On his return, beginning in the summer of 1887, Gordon took the first steps towards implementing the BAAS recommendation on the study of tides, obtaining the command of the steamship *Acadia* of the Fisheries Protection Service: that is, hiring himself out to the government in order to have the opportunity to initiate that research programme. The yearly periods of service on board the *Acadia* eventually paid off. In 1891 Gordon was appointed Nautical Adviser and Commander of the Fisheries Protection Services in the Department of Marine and Fisheries, with the rank of chief clerk and a salary of \$2,400 a year -- against \$1,200 he earned as deputy-superintendent of the Service.²⁵ But in a few months he fell ill and was dead in about a year at the age of forty-two.

The diverse activities and disparate sources of income of Andrew Gordon had a unifying logic: his scientific homeland, like that of his mentor Carpmael, the Cambridge 6th wrangler, was Britain. Not only did their work on the occasion of the transit of Venus and their collaboration with the BAAS in more than one project testify to the strength of the British scientific ties, but even Gordon's nautical activities fell in an imperial frame of reference. For all that pertained to navigation with its technical and international implications was subject to concurrent British and Canadian authority. In short, despite the collaboration between the US Weather Service and the Canadian Meteorological Service, the personal history and corresponding proclivities of the men who headed the Canadian institution made them more British than North American. In this they resembled Selwyn more than Saunders.

Gordon's pathetic and emblematic case, however, was by no means the rule. In general, scientists who could not transform their position into a permanent one, or, having achieved that goal were dissatisfied with their salary, simply left government service. Thus the Geological Survey, for example, acquired the honourable but bitter reputation of being a very good training institution. During the two decades 1876-1896, a number of scientists, mostly geologists, either acquired a permanent position in the Survey or started an association with it which later led to a permanent job. About a score of them, or roughly half, left the Survey for better-paid positions in the mining industry or in other walks of life. Notably, the majority of those hired in the same period who remained were young university graduates. Although the weight of older practitioners like Robert Bell, John Macon and J.F. Whiteaves was distinctly felt until the first decade of the twentieth century, the influence of the new, more academically-oriented personnel chosen by Selwyn and G.M. Dawson began to affect the style of the Survey. The upshot of this development was, as will be discussed later, further dissatisfaction on the part of the government despite, or possibly because of, the growing scientific reputation of the Survey. Not much that politicians would recognise as practical could come from men who not only chose and pursued an ill-paid career but also accepted the ban on any consulting activity.²⁶

A different breed of men joined the Experimental Farms System. The two main scientific figures, Saunders and Fletcher, were not just gifted amateurs but also, *pace* William Weld, men with good political connections. Likewise, the first superintendent of the Nappan, NS branch of the system was a successful farmer and politician. The Canadian-born Lieut-Col William M. Blair, who helped Saunders choose the location for the Maritimes branch, was the master of the Acadia Grange, Colchester County, NS since its establishment in 1875. He also founded the Provincial Grange of Nova Scotia in 1880 and was Master of the Dominion Grange in 1881. What is more, he was also Conservative MLA for Colchester from 1878 to 1886. He resigned his seat in the Legislature before the end of his term of office to take up the directorship of the

Nappan experimental farm.²⁷

In the West, the two farms at Brandon, Manitoba and Indian Head, East Assiniboia were set up during the last months of the Conservative rule in Manitoba when the party's imminent collapse was already manifest. The two directors, Spencer A. Bedford and Angus McKay, respectively, were chosen before the sites of the two farms were decided upon²⁸ and accompanied Saunders in his search for suitable tracts of land in the summer of 1887. At first glance, it would appear sensible first to choose the experts and then to let them work out the details of the programme. In reality, political issues determined all decisions. Spencer Bedford, the son of an English immigrant to Ontario, moved steadily west over the years -- first to Manitoba and later to Assiniboia -- partly farming and partly as an inspector and immigration agent for land companies. As the member of the NWT Council for Moosomin where he had a farm, from 1885 to 1888 he accumulated enough political credits to earn the directorship of one of the Western experimental farms. Brandon was eventually chosen for him after it had emerged as the winner over other Manitoba towns that had lobbied for the farm. The choice of Brandon was no doubt partly due to its growing importance as a grain shipping centre served by the CPR, but what carried the day was its mayor's influence in Ottawa. Thomas Mayne Daly, Conservative MP for Selkirk and the future Minister of the Interior, contacted J.A. Macdonald about the Manitoba experimental farm as early as February 1887.²⁹ By the end of the year, with a disastrous election in the offing, the appeals became more pressing. Dr George Orton, by then a medical officer in the Department of Indian Affairs, threw his weight behind Winnipeg's candidacy.³⁰ Daly, challenged by the Liberal press to bring the farm to Brandon if he could, told the Prime Minister that if Brandon was chosen 'it would help me very much.'³¹ In the end, Macdonald's support of Daly's case won Carling's consent.³²

The case of McKay and Indian Head was slightly more complex. Angus McKay was originally a stock breeder at Duffin's Creek, part of the 'Scotch settlement' of the predominantly Quaker Pickering Township in Ontario.³³ He sold his 200 acre farm in 1881, formed a company with some neighbours and moved in 1882 to Assiniboia where he bought more than 2,000 acres near Indian Head.³⁴ About the same time, a similar but much grander operation was started at Indian Head. The Bell Farm, for a time reputedly the second largest farm in the world with 100 square miles of land, became something of a celebrity during the few years of its survival. The initial controlling syndicate was composed of gentlemen farmers of known Conservative allegiance, mostly from the counties of Leeds and Kent in Ontario. The leader of this group and general manager of the farm, Lieut-Col William Robert Bell from Brockville, was a relation to the UEL and Tory Sherwood family prominent in Leeds county.³⁵ The Bell Farm became a centre of Conservative politics in the Northwest. Edgar Dewdney, the Indian Superintendent for the Territories and future Conservative Minister of the Interior, was one of the first presidents of the company which owned the Bell Farm.

Robert Crawford, a relation of Robert Bell's and one of the original stockholders, was elected to the NW Council in 1886 and Robert Bell himself unsuccessfully contested Qu'Appelle in the 1883 election for the NW Council.³⁶ Angus McKay, too, played a leading role in Qu'Appelle Valley politics. He ran for the NW Council as a farmers' candidate in 1885 and lost by a mere eleven votes to W.D. Perley, later a Conservative MP and Senator. McKay was also elected first president of the Indian Head Conservative Association in 1887.³⁷

The idea of a model farm attached to an agricultural college at Indian Head first sprung up when the Bell Farm ran into severe financial difficulties in 1886. With the help of Professor Henry Tanner of the British Department of Science and Art in South Kensington, Robert Bell devised a plan that would attract British investors who would in turn be given on-the-spot agricultural instruction. The scheme seemed promising for a time, especially since Saunders' 1886 report on experimental farms recommended that one farm should be located in the NWT.³⁸ In the event, a different political development brought about a modified solution. Robert Crawford's election to the NW Council in autumn 1886, engineered by Angus McKay, earned the latter the gratitude of W.D. Perley, then Conservative MP for East Assiniboia. Perley obtained for McKay the directorship of the northwestern experimental farm which, in turn, was set up on a portion of the broken-up Bell farm.³⁹

In addition to his political merits and general proficiency in farming, McKay has been credited with having discovered the advantages of summer fallowing -- the technique that was to permit successful wheat growing in the arid prairies -- when he had to hire out his ploughing teams in the spring of 1885 to make possible the transportation of supplies from the CPR to the troops engaged in putting down the second Riel rebellion.⁴⁰ Without denying McKay's leading role in the *diffusion* of the technique which he promoted in his capacity of director of the Indian Head Experimental Farm, it should be noted that Professor J.P. Sheldon of the Downton College of Agriculture in Salisbury, England observed experiments in summer fallowing being carried out at the Bell Farm at the time of the 1884 Canadian meeting of the British Association.⁴¹

Like his colleagues in Nova Scotia, Manitoba and Assiniboia, the director of the British Columbia experimental farm was originally a practical farmer. Thomas A. Sharpe was the son of an Irish immigrant who settled in Frontenac county, Ontario near the present-day village of Sharpton around 1837. After working as a carpenter and as a farmer for fifteen years, Sharpe moved to Wakopa in Southern Manitoba near the US border in 1877 at the age of thirty.⁴² By 1884, Sharpe came to own about 1,000 acres of land and was one of the largest landowners in the area. He engaged in general agriculture and stock breeding and ran, first alone and later with partners, a cheese and butter factory. In the early 'eighties, he also established for himself something of an expert's reputation with Ottawa emissaries by taking part in the 1880 Geological Survey expedition, headed by A.R.C. Selwyn, to

Turtle Mountain in search of coal and in advising the federal land surveyor William Pearce on the possible harmfulness of certain grasses to sheep.⁴³ It is perhaps an indication of Sharpe's political sympathies that he applied for the post of director of the Agassiz Experimental Farm in British Columbia, soon after the 1888 collapse of the Manitoba Conservatives. The recommendation of William Pearce, who by then had risen high in the federal civil service, secured Sharpe the job.⁴⁴

The criteria of selection of the directors of peripheral farms were thoroughly successful. All four men proved very well suited to their task over the two decades that followed the establishment of the Experimental Farms System. That approach, however, did not work nearly so well when applied to the Central Farm where specialist expertise was relatively more important. The appointment of the first horticulturist is a case in point. William Wilson Hilborn was the only applicant for the job, which was in itself surprising considering how many people started soliciting a position directly or through influential friends, as soon as it became clear that the experimental farms would be created. Hilborn, however, was known to Saunders as a member of the extensive Hilborn family of Bosanquet township in Lambton County, adjacent to Middlesex, and as the brother of Nelson Hilborn, a prosperous farmer and local Conservative notable.⁴⁵ Furthermore, Saunders and William Hilborn collaborated in the occasion of the shipment of Canadian agricultural exhibits to the Colonial and Indian Exhibition of 1886. After three years of work in Ottawa, however, the horticulturist resigned at the end of 1889, to be succeeded by John Craig, a former pupil of the private scientific farmer Charles Gibb of Abbotsford, Quebec and of Iowa Agricultural College. With Craig, the work of the horticulturist began to be coordinated with that of the scientific personnel of the Central Farm, thus making sharper the demarcation between the type of research done in Ottawa and that, very practical, performed at the peripheral farms.⁴⁶

In short, Saunders tended to hire men in his own image. The policy amounted to a compromise between the views reported above of Fisher and Penhallow. The men with managerial responsibilities were doers first and researchers second. The only academic scientists, chemist Frank T. Shutt and a graduate and fellow of the University of Toronto, had a supportive service function towards the activities chosen and pursued by his colleagues at the Central Farm. He was also the only one among Saunders' first appointees not to have any obvious political connection.⁴⁷

In fairness, it must be said that appointments and promotions on the basis of scientific achievement alone were not unbroken rules in other scientific branches of government as well. It was natural that, in a country with few inhabitants and less educated people, the few persons with an interest in science would tend to be or to become related. It is also well known that talent is at times a family trait. Yet the number of dynasties in the federal scientific services could not be explained solely on the basis of socialisation and

heredity. The examples are endless; they extend from the three Barlows over two generations in the Geological Survey to the two sons of William, Charles (later Sir Charles) and Percy Saunders, hired by the Experimental Farms to the two nephews of Robert Bell, James Mackintosh Bell and G.A. Young -- the last also a relation of A.P. Low and all employees of the Geological Survey. John Macoun, Sandford Fleming's companion in his expeditions in the Northwest, also saw his sons employed by the federal government. William Tyrrell Macoun became Dominion Horticulturist at the Ottawa Central Farm, whereas James Melville inherited his father's position as head of the biological division of the Geological Survey upon his death. In a similar vein, Edward Ashe's son William inherited his father's directorship of the Quebec Observatory. Thomas Menzies' son, also William, succeeded his father as observer at Toronto at the latter's death. And William Blair, son of Lieut-Col W.M. Blair was appointed horticulturist at Nappan during his father's tenure as superintendent. Finally, the man who took up the work on tides initiated by Gordon, W.Bell Dawson, was a son of Principal Dawson of McGill and the brother of the director of the Geological Survey.

The examples could continue. What they indicate apart from more or less excusable cases of nepotism is that the type of scientific career fostered by the federal government in the years under examination did not approximate the elitist, meritocratic model embodied by the Royal Society of Canada. When the practices and values of the world of politics came into direct conflict with those of the world of science, the latter tended to be overcome. Without strong outside support such as that which could, but was not, provided by the universities, the scientific ethos received an interpretation within federal agencies which was distinct and peculiar to Canada.

On the whole, the way in which government science developed during the Conservative years reflected the state of partial professionalisation of the scientific community. In the absence of firm professional standards collectively framed and accepted by most Canadian men of science, the government set its own standards. In this way political allegiance, family connections and competence became concurrent criteria of employment. The particular blend of these three elements that was deemed appropriate in any given case depended upon the particular scientific department involved and the interest it served as well as on the degree of professional identity of the practitioners of the relevant discipline. Thus the geologists of the Survey -- practitioners of a well-established discipline and employees of a long-established institution -- by and large managed to resist the attempts to correct what the politicians judged to be an excessive bias in favour of speculative science. Conversely, the Experimental Farms bore the clear mark of politics, generated as they were from within the political process and not as the result of pressure of the community of science at large and manned by cultivators of a new and still rudimentary discipline.

In view of the fact that a recognisable logic regulated the relations between politics and science, it may be justifiable

to wonder whether a policy is in any way detectable. In a sense, the key notion of statistics which dominated the lay understanding of useful scientific work did amount of a policy criterion, for it determined the politicians' judgment of what a scientific service ought to be. But as the schemes for the collection of various statistics either failed or were only partially realised, what was left was a preference for a type of scientist -- fast becoming old fashioned -- for whom doing research amounted to collecting 'scientific' facts. Things began to change only after the task of determining professional standards for scientists was taken up by Canadian universities. In the process, a new understanding of the nature and purpose of research, derived at more than one remove from German models, found its way into Canadian cultural life.

NOTES

1. 'Report of the Select Committee appointed by the House of Commons to Obtain Information as to the Agricultural Interests of Canada,' House of Commons, *Journals* 18 (1884), Appendix 6, 166 (testimony of D.P. Penhallow).
2. 'Report of the Select Committee Appointed by the House of Commons to Obtain Information as to Geological Surveys,' House of Commons, *Journals* 18 (1884), Appendix 8, 33.
3. 'Report ... Agricultural Interest of Canada,' *loc. cit.*, 165-6.
4. E.M. Pomeroy, *William Saunders and His Five Sons* (Toronto, 1956); *History of the County of Middlesex, Canada* (London, 1889).
5. C.J.S. Bethune, 'Annual Address of the President of the Entomological Society of Ontario, 1875,' Ontario, *Sess.P.* 8 (1875-6), No. 1, Appendix E, 331; W. Saunders, 'Annual Report of the Entomological Society of Ontario for the Year 1875,' *ibid.*, 337-8 and 140. F.W. Putnam, 'History of the Meeting,' *AAAS, Proceedings* (1874), pt. 2, 153.
6. In 1868, when Saunders and Bethune began publishing the successful *Canadian Entomologist*, Riley and his mentor and patron B.D. Walsh, State Entomologist of Illinois, started the *American Entomologist*. The latter journal ceased publication after three volumes had appeared at uneven intervals. Grote's *North-American Entomologist*, started in 1879, never went beyond the first volume.
7. London and East Middlesex were the two most securely Conservative ridings in the county of Middlesex. T.L. Armstrong, *The City of London and County of Middlesex Directory for 1871-72* (Strathroy, 1871), 84-5. *Canadian Parliamentary Companion for 1885*, 221. Cf., also O. Miller, *A Century of Western Ontario* (Toronto, 1949); *History of the County of Middlesex* (London, 1889), and Pomeroy, *op. cit.*

8. W. Weld, 'More Model Farms -- Prospects of the Experiment Stations Established by the Dominion Government -- Are Model Farms Booms or Boons?', *Farmers' Advocate* (July 1886), 194.
9. P. Miller, *The Life of the Mind in America* (New York, 1965), 319.
10. 'Report of the Select Committee Appointed by the House of Commons to obtain Information as to Geological Surveys,' House of Commons, *Journals 18* (1884), Appendix 8, 51 (G.M. Dawson's testimony).
11. *Debates*, 15 July 1885, 3410.
12. 53 Vic., cap. 11, s. 10. For Joseph Rymal's and James Trow's dismay, cf. *Debates*, 18 March 1890, 2129 and 2138.
13. R. Bell to D.L. Macpherson 29 April 1884, PAC RG 15, vol. 313, file 74880.
14. 'Report ... as to Geological Surveys,' House of Commons, *Journals 18* (1884), Appendix 8, 87-9.
15. *Loc. cit.*, 136 (R.W. Heneker's testimony).
16. G. Smith, *The Bystander*, n.s. (1889), 88.
17. *Debates*, 23 February 1882, 69-72 and 11 April 1882, 791-8.
18. C. Carpmael to A.R. Gordon 23 October 1880, Atmosphere Environment Service (AES), Meteorological Service Papers, file 1880D. 'Report of the Meteorological Service ... 1880,' *Sess. P. 14* (1881), No. 11, Appendix 34, 231; 'Report ... 1881,' *Sess. P. 15* (1882), No. 5, Appendix 28, 175.
19. 'Report of the Meteorological Service ... 1883,' *Sess. P. 17* (1884), No. 7, Appendix 35, 198.
20. *Debates*, 7 May 1883, 1035-6; cf., 45 Vic., cap. 4, s. 34 vs. 48-9 Vic., cap. 46, s. 37.
21. J. Langton, 'Report of the Committee Appointed to Enquire into the Past History and Present Position of the Magnetic Observatory. 1879,' MS, University of Toronto Archives, (UTA), Observatory Papers. J.A. McDonnell to J. Langton, 18 July 1884, *ibid.*
22. E. Deville to Wm. Smith, 30 May 1892, PAC, RG 15 B-12, file 296233. Cf. also Wm. Smith to C. Carpmael 21 March 1892, PAC, RG 93, file 1359.
23. 'Report ... 1881,' *Sess. P. 15* (1882), No. 4, Appendix 28, 175.
24. A 6" equatorially mounted achromatic telescope by the firm T. Cooke & Sons, Buckingham Works, York. 'Report of

- the Magnetic Observatory ... 1882,' Sess. P. 16 (1883), No. 7, Appendix 26, 181.
25. A.R. Gordon, Sess. P. 21 (1888), No. 6B Appendix D, and Sess. P. 22 (1889), No. 8A, Appendix A. Wm. Smith to C. Carpmael 6 December 1883, AES, Meteorological Papers, file 18832.
 26. Selwyn noted in 1882 that the Dominion government paid geologists about half as much as their British colleagues in equivalent positions received. In the same memorandum Selwyn also pleaded in favour of job security, and added that 'without some such guarantee well trained and efficient men would not be induced to join the ranks of the Survey, nor regard it as a field in which they might hope by energy and industry to gain credit and distinction in their profession.' But job security also meant that scientists were paid on the basis of the same (low) salary scale as all other civil servants; A.R.C. Selwyn 'Report ... to Sir J.A. Macdonald,' MS 1882, PAC, RG 45, vol. 16, file 2.
 27. W. Saunders, 'Experimental Farms. Reports ... for 1888,' Sess. P. 22 (1889), No. 5B, p. 5. L.A. Wood, *Farmers' Movements in Canada* (Toronto, 1924), 55, 65, 91; *Canadian Parliamentary Companion for 1885; History of the Grange in Canada with a List of Division and Subordinate Granges, & their Executive Officers* (Toronto, 1876).
 28. OC 1462, PAC, Privy Council Records, RG 22, vol. 370 (received 4 July 1887, approved 18 July 1887). Cf., also Qu'Appelle, *Vidette*, 19 May 1887.
 29. T.M. Daly to J.A. Macdonald, 4 February 1887, PAC, Macdonald Papers, pp. 216959-61.
 30. G.T. Orton to J.A. Macdonald, 20 October 1887, J. Carling to J.A. Macdonald 10 November 1887, PAC, Macdonald Papers, pp. 223083-88.
 31. T.M. Daly to J.A. Macdonald, 3 November 1887, PAC, Macdonald Papers, pp. 223348-49.
 32. J. Carling to J.A. Macdonald, 8 November 1887, PAC, Macdonald Papers, pp. 223351-2. Cf. also PAC, RG 17 I 1, files 58263, 58460, 58918, 59212 and 59232.
 33. *Illustrated Historical Atlas of the County of Ontario, Ont.* (Toronto, 1877), 18-19, 20, and 60. Cf., also W.H. Higgins, *The Life and Times of Joseph Gould* (Toronto, 1887).
 34. J. Hawkes, *The Story of Saskatchewan and Its People* (Regina, 1924), vol. 2, 1035.
 35. For the act of incorporation of the Qu'Appelle Valley Farming Co. (Ltd.), cf. *The Dominion Annual Register and Review for ... 1882* (Toronto, 1883), 369-70. Cf., also

T.W.H. Leavitt, *History of Leeds and Grenville Ontario from 1749 to 1879* (Brockville, 1879), *passim*.

36. N.F. Black, *History of Saskatchewan and the Old North West* (Regina, 1913), 500; Qu'Appelle, *Vidette*, 7 October 1886. Cf., also Qu'Appelle, *Vidette*, 9 October 1884 for the friendship between Bell and Dewdney.
37. Qu'Appelle, *Vidette*, 27 August 1885, 3 September 1885, 10 September 1885, 22 October 1885, 10 February 1887.
38. H. Tanner, *Successful Emigration to Canada* (London, 1884). Qu'Appelle, *Vidette*, 14 January 1886, 25 March 1886, 1 April 1886.
39. Qu'Appelle, *Vidette*, 14 October 1886, 19 May 1887. Cf., also J. Hawkes, *The Story of Saskatchewan and its People* (Regina, 1924), vol. 2, 1043.
40. W.J. Rutherford, 'Economic Resources of Saskatchewan,' in A. Shortt et al. (eds.), *Canada and its Provinces* (Toronto, 1914-17), vol. 20, 559-60.
41. J.P. Sheldon, *To Canada, and through it, with the British Association* (Ottawa, 1886), 16.
42. Ontario Archives, Census Returns 1851; Kingston Township, Part I, Frontenac County, Canada West, folio 39; W. Saunders to J. Carling, 13 May 1889, PAC, RG 17 A I, file 69402; *Illustrated Historical Atlas of Frontenac, Lennox and Addington* (Toronto, 1878), 44-5.
43. A. Garland, *Trails and Crossroads to Killarney* (Altona, 1967), 40, 52, and 306; *Beckoning Hills* (Boissevain, 1956), 38; A.D. Doerksen, *The Saga of Turtle Mountain Coal* (Altona, 1971), 3; W. Pearce, 'Extract from Report of Standard Outlines ...,' Sess. P. 14 (1880-81), No. 3, pt. I, 46.
44. W. Saunders to J. Carling, 13 May 1889, *loc cit*.
45. W. Saunders to J. Carling, 5 November 1886, PAC, RG 17 A I, file 56238; *Commemorative Biographical Record of the County of Lambton Ontario* (Toronto, 1906), 633.
46. W. Saunders, 'Experimental Farms. Reports ... for 1890,' Sess. P. 24 (1891), No. 6C, 49. Cf., also the joint work with the chemist Frank Shutt: J. Craig, F.T. Shutt, 'Effect of Fungicides on Apple Leaves,' *op. cit.*, 97-100. Charles Gibb and Professor J.L. Budd of Iowa Agricultural College were in strict contact for many years; they went together on a trip to Russia in 1882 where Budd had been invited by the Agricultural College of Moscow and by the botanic garden of St. Petersburg. Cf. W. Saunders, 'A Report on Agricultural Colleges ...,' Sess. P. 19 (1886), No. 10, Appendix 54, 227-8.
47. Shutt, however, was first known to Saunders as the chemistry tutor of his two sons at the University of Toronto, cf. UTA, Trustees Files, Frank Thomas Shutt.